The Hawaiian Diet at Maui Memorial Hospital

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Introduction

The incidence in Native Hawaiians of diabetes, renal failure, diabetes, hypertension, heart disease, obesity, cancer, and other degenerative diseases is one of the highest in the United States.[1-7] A large part of their illness arises from poor nutritional practices, with massively excessive consumption of calories, protein, fats, and salt.

Research in the mid-1980s performed by the Molokai Heart Study Group of Molokai[8] and by Dr Terry Shintani[9] of Waianae, Oahu, demonstrated conclusively that many of the physical and biochemical indicators of disease among Native Hawaiians could be markedly improved by placing them on a diet of traditional Hawaiian foods under a supervised program of organized, culturally appropriate eating and teaching. A recent article in the *Hawaii Medical Journal* reviewed the history and rationale of the Hawaiian (or Waianae) Diet.[10]

Three years ago, building on the success of the demonstration studies, the State of Hawaii established a Hawaiian Health Program which obtained state and federal grants to promote application of the findings among Native Hawaiians. Under these auspices, the *Hui No Ke Ola Pono* was founded and funded to promote health among the Hawaiian population of Maui County. The *Hui* has since organized several 3-week dietary programs for groups of about 20 persons, including the indispensable elements of serving traditional Hawaiian foods, dispensing culturally relevant dietary and sociological information, and utilizing a communal setting to enhance mutual support and follow-up.

This program met with unqualified success in several localities around Maui. Several physicians from Maui Memorial Hospital participated in these programs and were impressed with the results in patients who participated. In early 1993, the Nutrition Committee of Maui Memorial Hospital engaged *Hui No Ke Ola Pono* to help with the design and implementation of a hospital-based Native Hawaiian diet program for hospital employees.

The purpose of having the program at the hospital was twofold: 1) to offer a positive program for health improvement to hospital employees who suffered from conditions of nutritional excess (diabetes, hypertension, obesity, etc.); 2) to begin the process of establishing a Hawaiian diet food-line at Maui Memorial Hospital for the benefit of hospitalized patients who were on the diet at home and for those who could medically benefit from being placed on the diet, including hospital staff.

This program became a joint effort of the dietary department and kitchen of MMH and the *Hui No Ke Ola Pono*. After months of preparation, the dietary participation program took place in January 1994 over 3 weeks in the cafeteria of MMH and all participants agreed it was a success. All participants experienced improvement in their health status, their feeling of well-being, and their sense of empowerment over their health.

The follow-up in the post-dietary period has been less than satisfactory, however, with the majority of participants reverting to previous dietary habits. This points out a common problem in the Hawaiian diet program as a whole: Substantial recidivism. In addition, the goal of establishing Hawaiian traditional foods on the food-line has not been achieved.

This paper will review and analyze the elements of the program as performed at MMH and propose future directions to further promote this important movement.

Maui Memorial Hospital Dietary Participation Program

Organization, Funding, and Division of Responsibilities.— From the inception of the idea of the Nutrition Committee of MMH to engage the *Hui* to bring the Hawaiian diet to MMH in the Spring of 1993, initial meetings were held over several months during which issues of authority, responsibility, and timing were discussed and agreement reached between the *Hui* and MMH.

A time line was developed and responsibilities were delineated. Issues of location, logistics, funding and division of labor were addressed as follows:

- Site and Equipment. The MMH kitchen and dining room were used as the cooking, educational, and dining area. Kitchen equipment was used without modification. Food preparation: Breakfast at 4 am to 5 am; dinner at 1:30 pm to 3:30 pm.
- Funding
  - *Hui No Ke Ola Pono* utilized grant monies for research program and oversight personnel.
  - The cook and small staff were paid from participants' fees.
  - Participants paid $5/day for program participation.
  - Food was purchased via the hospital food purchase budget.
  - Laboratory was paid for by insurance or personal payment.
- Program Elements and Division of Responsibility
  - Meal preparation was performed by the cook and her small staff with help from members of the MMH food service staff.
  - Dietary and health instruction was provided by the nutritionist, nurses, physician and invited lecturers.
  - Orientations, public meetings, and interviews and participant selection were organized and presented by the *Hui*, nutritionist, past patients, MD, and nurse.
  - Lectures and group presentations were given by invited lecturers, *Hui* staff, nutritionist, and nurse.
  - *Hulacize*, a form of hula and exercise done daily by the participants, was lead by the *Hui* and volunteers.
  - Scheduling of employee participants was done by dietary department, nursing department, other participants' departments, and *Hui*.
  - Research functions.
    1) Data collection and tabulation was performed by dietary, nursing, and the *Hui*.

2) Data analysis and publication was performed by the *Hui* and a physician.

Participant Selection

- Ethnicity.—Participants were selected preferentially, though not exclusively, from Hawaiian-ancestry kitchen staff and hospital staff.
- Health status.—Obese, hypertensive, diabetic participants were selected preferentially; persons with renal disease and cancer were excluded.
- Screening and selection were based on *Hui* criteria and procedures.
- Medical supervision
  - Each participant had a personal physician willing to pre-evaluate the participant and sign appropriate forms and releases.
  - The overseeing physician for the course monitored each participant throughout the course of the diet.
- Laboratory.—The personal physician ordered lab tests and the overseeing physician interpreted the lab work required by the protocol.
- Hospital personnel
  - Dietary department personnel needed some program modification so they could perform their duties and attend the program.
  - Nursing and other staff members needed to obtain relief from the heads of their departments so they could reliably participate during working hours.

Methodology

- Participant Selection Process.
  - Initially, a questionnaire was distributed to the medical staff to elicit physician knowledge and acceptance of enrolling patients into the Hawaiian diet. Once positive response among the physicians was ascertained, two public information meetings were held for the hospital staff, after which interested staff were asked to sign a list indicating interest in participating in the diet program.
  - Interviews were then conducted and participants were selected on the basis of appropriateness, eagerness, and health status.
- Participant preparation.
  - Smoking and drinking alcohol and coffee were discontinued for at least one week prior to the initiation of the study.
  - Laboratory tests were conducted several days before the initiation of the study.
- Diet.
  - Pre-program.
    1. A 3-day diet history was obtained for each of the participants.
    2. Participants were instructed to cut down on caloric intake a few days prior to initiation of the program.
  - Program.
    1. All food was prepared in the kitchen of MMH by the cook and her staff, with the help of 2 kitchen staff participants.
    2. The first week's diet consisted of traditional Hawaiian dietary foods (taro, poi, sweet potatoes, breadfruit, fish, chicken, watercress, oranges, bananas, and seaweed) with a transitional diet incorporating Western foods introduced the second week.
- Exercise.— Walking, stretching, and "hulacize" were offered just prior to the evening meal daily.

Results

(All values represent mean and standard deviation; p values not calculated due to the small number of subjects and large variations in values).

- Participant Profile. (Table 1).
  - Sex: One man participated (No 15), all others were women.
  - Age: The mean age was 41 + 7.7 years, with a range of 30 to 50 years.
  - Ethnicity: 8 of the participants were of mixed Hawaiian ancestry; 12 were Asian (4 pureblood); and 4 were Caucasian.
  - Obesity: 11 of the 17 participants were over 20% of their ideal body weight; 8 of the participants were over 50% of their ideal body weight.
  - Diabetes mellitus: 5 of the participants were diabetic, 3 of whom were insulin dependent.
  - Hypertension: 6 of the participants were hypertensive on medication at the initiation of the study.
- Physical parameters (Table 2; Fig 1)
  - Weight: 17 participants weighed an average of 217 lbs at the start of the study. The average weight at Week 1 was 209.6 lbs. The weight at Week 3 was 206.9 lbs. The average weight loss at the end of the 3-week period was 10.3 + 6.2 lbs. Those participants with the greatest weight-loss had the largest amounts of weight.
  - Blood Pressure: the average systolic blood pressure was 130.3 mm Hg at the start of the study, decreasing to 123.5 mm Hg on Week 1, and to 114.8 mm Hg on Week 3. Diastolic blood pressures were comparably reduced throughout the course of the study; blood pressures dropped in both hypertensives and normotensives.
- Biochemical values (Table 3).
  - Glucose: initial values for glucose averaged 132.0 mg% falling to 125.3 mg% on Week 1, and to 107.2 mg% by Week 3. Participants on insulin were able to substantially reduce their dosages of insulin (Nos 7 and 8) or discontinue insulin and start oral hypoglycemic medication (No 9). Two participants who were not on medications (Nos 2 and 10) had substantial drops in their glucose values during the course of the study.
  - Cholesterol: initial values for cholesterol averaged 185.9 mg%, which fell progressively to 169.6 mg% by Week 1,

Table 1.—Demographic Data on 17 Participants in the MMH Hawaiian Diet Program

Pt	Age (yrs)	Ht.	Wt.	Race	Condition
1	59	5' 2"	115	A	–
2	35	5' 7"	401	C	DM, HTN, O
3	49	4' 11"	126	A	–
4	39	5' 4"	323	A	O
5	49	5' 6"	274	H, A	HTN, O
6	44	5' 8"	271	H, A	–
7	30	5' 2"	132	C	DM
8	35	5' 4"	215	H, A	DM, HTN, O
9	38	5' 3"	208	C	DM, HTN, O
10	50	5' 3"	168	H, A	DM, HTN
11	44	5' 3"	128	H, A	–
12	33	5' 1"	126	A	–
13	33	5' 4"	271	H, A	HTN, O
14	43	5' 4"	245	H, A	O
15	45	6' 2"	191	C	–
16	36	5' 6"	234	C	O
17	34	5' 6"	180	H, A	O

A = Asian; H = Hawaiian; C = Caucasian
HTN = hypertension; O = obesity; DM = diabetes mellitus

Table 2: Weight, Systolic and Diastolic Blood Pressure Values for 17 Participants in Hawaiian Diet at MMH

	Weight (lbs)				Systolic BP (AM)				Diastolic BP (AM)			
	Start	1st Wk	End	Change*	Start	1st Wk	End	Change*	Start	1st Wk	End	Change*
1	116	115	115	-1	136	128	122	-14	90	78	80	-10
2	401	383	374	-27	152	132	140	-12	108	94	94	-14
3	126	124	122	-4	137	110	122	-15	89	66	80	-9
4	323	316	313	-10	117	108	96	-21	94	68	70	-24
5	274	264	259	-15	140	140	140	0	91	88	90	-1
6	271	258	255	-16	120	98	90	-30	50	68	52	2
7	136	132	129	-7	113	120	118	5	77	74	72	-5
8	215	209	209	-6	150	160	150	0	86	90	96	10
9	288	277	273	-15	155	150	136	-19	69	70	84	15
10	168	162	156	-12	146	136	100	-46	102	88	78	-24
11	128	122	122	-6	134	106	104	-30	94	72	74	-20
12	126	122	119	-7	96	92	90	-6	73	76	64	-9
13	271	260	259	-12	150	148	–	–	104	82	–	–
14	245	235	230	-15	130	126	118	-12	86	88	86	0
15	191	183	183	-8	125	122	110	-15	80	82	80	0
16	234	228	224	-10	110	106	90	-21	80	80	72	-8
17	180	174	176	-4	104	118	110	6	66	70	68	2
Mean	217.2	209.6	206.9	-10.3	130.3	123.5	114.8	-14.3	84.6	76.3	77.1	-6.9
STD	79.0	75.4	73.9	6.0	17.5	18.6	18.8	13.4	14.4	8.8	10.1	10.7
N	(17)	(17)	(17)	(17)	(17)	(17)	(16)	(16)	(17)	(17)	(16)	(16)

*Difference between start of study and end of study

Table 3: Glucose, Cholesterol and Triglyceride Values for 17 Participants in Hawaiian Diet at MMH

	Glucose (FBS mg%)				Cholesterol (mg%)				Triglycerides (mg%)			
	Start	1st Wk	End	Change*	Start	1st Wk	End	Change*	Start	1st Wk	End	Change*
1	98	89	90	-8	218	228	186	-32	101	86	86	-15
2	236	142	123	-113	213	229	193	-20	164	162	133	-31
3	82	92	84	2	180	174	154	-26	77	131	78	1
4	109	108	97	-12	217	159	189	-28	150	153	154	4
5	113	100	95	-18	149	132	111	-38	85	100	76	-9
6	93	99	97	4	176	189	147	-29	93	90	91	-2
7	121	87	90	-31	138	139	144	6	33	60	38	5
8	341	318	–	–	220	114	–	–	342	244	–	–
9	220	287	225	5	169	157	147	-22	87	90	78	-9
10	144	126	133	-11	225	202	193	-32	162	160	144	-18
11	100	99	97	-3	170	121	136	-34	64	25	31	-33
12	95	94	–	–	151	142	–	–	59	54	–	–
13	90	91	–	–	160	139	–	–	54	–	–	–
14	107	108	91	-16	205	215	163	-42	130	110	98	-32
15	89	87	89	0	251	173	246	-5	131	52	100	-31
16	110	106	99	-11	171	168	136	-35	323	169	183	-140
17	96	97	91	-5	148	202	163	15	51	66	65	14
Mean	132.0	125.3	107.2	-15.5	185.9	169.6	164.9	-23.0	123.9	109.5	96.8	-21.1
STD	67.3	66.4	35.2	28.6	32.4	35.4	32.7	16.3	85.4	55.09	41.7	36.2
N	(17)	(17)	(14)	(14)	(17)	(17)	(14)	(14)	(17)	(16)	(14)	(14)

*Difference between start of study and end of study

and 164.9 mg% by Week 3. Twelve of 14 participants had substantial drops in their cholesterol levels, without relation to their initial values.

- Triglycerides: initial values for triglyceride averaged 123.9 mg%, which fell progressively to 109.5 mg% by Week 1, and to 96.8 mg% by Week 3.
- No significant changes in electrolytes, liver, and renal functions were seen in the group as a whole throughout the study.

• Antihypertensive medications: the 6 hypertensive participants initially had a dramatic fall in their blood pressures, necessitating a diminution in their dosage of antihypertensive medications. However, by the third week, doses had to be increased again, but below pre-diet levels.

• Diet records. (Tables 4)

- Average caloric intake declined from pre-program level of 2,287 calories to a Week 1 value of 1,529 calories.
- Average fat content of the pre-program diet was 39% of the total caloric intake, which was reduced to 5% on Week 1.
- Average sodium chloride content of the diet was 3,527 mg/24 hour pre-program, and down to 849 mg/24 hr by Week 1.

• Patient compliance and tolerance.

The diet program was tolerated by the majority of the participants without complaint or problem. There was only 1 dropout in the program, and this was because of work scheduling conflicts (A busy dialysis nurse). There were 3 participants who felt nonspecific symptoms such as weakness, dizziness, fatigue, and hunger during the first few days of the program, but these symptoms resolved by the second week.

There was a high degree of fellowship and camaraderie developed during the program among the participants. For 3 weeks, 2 meals a day were eaten in a communal setting,and mutual support became a means for encouraging compliance and cross-education.

The formal program of instruction by the dietitian and by the speakers was supplemented by the participants own interest in their own health improvement.

Discussion

This program successfully demonstrated several things.

• A healthful diet based on the Hawaiian traditional foods could be prepared and served to a group of high risk Hawaiian-ancestry staff at a state facility in a supervised program without risk and with a high degree of compliance and acceptance.

• Although not as pronounced as the changes seen in the Waianae Diet Program study reported by Dr Shintani in 1991,[9] several very positive health outcomes were experienced by the participants. Hypertensives experienced a drop in blood pressure and decreased their medications. Diabetic staff had a decrease in blood glucose, and decreased their insulin requirements. Almost all participants lost a significant amount of weight. All participants, despite their medical backgrounds, learned a great deal about nutrition during the program, but in particular, learned that they were capable of eating properly for a sustained period of a few weeks, and that they could tolerate a healthy diet.

• Despite the complexity of the program, a high level of cooperation could be obtained between two state agencies, the *Hui No Ke Ola Pono* and Maui Memorial Hospital, to plan the program, divide responsibilities, define roles, and work together throughout the program without conflict or "turf battles."

• The kitchen and dining facility at Maui Memorial Hospital was adequate for the acquisition, preparation, and serving of the food, as well as providing adequate space for the communal eating and educational aspects of the program.

Problems experienced were:

• There was resistance among some kitchen employees to the program who said there was an imposition on them in terms of space requirements, and to a lesser extent, equipment use.

• Follow-up in the hospital for program participants has been severely hampered by the lack of staff and space in the kitchen to prepare an extra meal. A similar shortage of dietary staff has curtailed the ability to change the recipes to more healthful diets such that participants might be able to eat institutional food at their place of work that would be healthful for them and allow them to continue healthy eating. For this reason, most of the employees who participated in the diet program have been unable to continue their diet program. This has been the experience for most of the Hawaiian diet programs, and indeed for most intensive comprehensive dietary programs.

• Under current staffing and budgetary constraints in the state hospitals, there is no foreseeable time when the food line at the hospital could be modified to serve traditional foods to the hospital patients or staff who would benefit from the diet (ie,

those who have been through the program or those for whom it would be medically indicated as determined by their physicians).

Proposal for the Hawaii Department of Health

Since the Hawaiian diet program was an unqualified success at Maui Memorial Hospital resulting in the improvement of all major health parameters of the at-risk participants, we propose that the program be continued in a more formal manner throughout the state hospital system under the auspices of the Division of Community Hospitals of the Department of Health.

With the cooperation and help of the various Hawaiian health organizations, such as the *Hui No Ke Ola Pono* on Maui, and corresponding groups on the other islands, the dietary departments and kitchens of the state hospitals could be mandated to offer similar programs of Hawaiian diet to at-risk or willing employees on an ongoing basis, perhaps several times a year. Such programs could become the basis of a wider employee health program, including nutritional counseling, cholesterol monitoring, exercise and fitness programs, and counseling.

In order to maintain program participants on modified diets, the kitchens of our state hospitals would need to be able to prepare the basic Hawaiian foods on a daily basis as a routine product of the hospital and cafeteria food lines. This would not only serve employees who had gone through the program, but would also enable patients who had been through the program to continue their diets while hospitalized, and allow patients who had not been through a formal program to sample the traditional foods that they would be eating if they were to enter a program.

If these changes were accomplished, the next step would be for the hospitals to act as centers for community dietary training programs, where community members could come for formal programs of education in the preparation of traditional Hawaiian foods and modified diets. The same format of 3-week intensive programs such as have been offered to employees could be extended to community members on the premises of the hospital. In this way, our community hospitals would be engaging in the real practice of preventive medicine in the community at large, thereby fulfilling a major part of its strategic goal of becoming a real community medical center. Such a program would also engender cooperation with other community organizations, such as the Hawaiian health groups (*Hui No Ke Ola Pono*) which are underfunded to carry on such programs on their own.

In conclusion, it would be a real tragedy if the knowledge that has been acquired thus far in well-designed and successful scientific and cultural programs were not amplified and instituted in the most obvious and practical way available, in the community hospitals, which are supposedly the primary resource for health in the community at large. Such an expanded program would have great support in our community and certainly similar communities throughout the state. Our experience at Maui Memorial Hospital has demonstrated that such a program can be carried out easily, with minimal expense and staff, and can tangibly benefit the health of the participants. This experience should be extended to the community at large, and the community hospitals are a logical and practical place to accomplish this.

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Fig 1. — Weight Changes in MMH

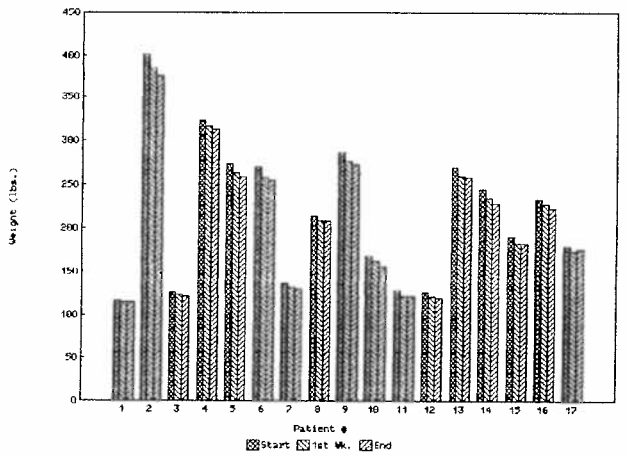

Table 4: Pre Diet an First Week Nutritional Values for 17 Participants in Hawaiian Diet Program at MMH

PRE-DIET NUTRITIONAL VALUES

Patient	Calories (kcal)	Carbohydrate (gms)	Protein (gms)	Total Fat (gms)	Saturated Fat (gms)	Cholesterol (mgs)	Sodium (mgs)
1	2 439	291	121	78	22	385	4 202
2	2 131	200	79	121	29	135	3 040
3	1 485	189	77	56	16	267	3 187
4	2 835	313	93	122	48	349	2 505
5	2 191	272	64	103	23	81	2 232
6	1 857	257	69	65	23	219	2 502
7	2 165	255	92	88	21	363	3 885
8	1 513	193	72	50	13	263	2 111
9	1 919	183	84	95	25	494	3 394
10	3 256	293	118	149	48	544	4 738
11	1 785	204	86	64	20	230	1 378
12	2 889	274	136	139	45	711	5 413
13	1 367	122	58	75	12	98	2 449
14	4 014	469	153	164	45	782	7 421
15	3 353	288	141	148	49	630	5 670
16	2 645	288	107	119	44	538	3 173
17	1 346	126	77	49	15	382	2 666
Mean	2 287 cals	749 gms	95 gms	99 gms	29 gms	403 mgs	3 527mgs
STD	724	83	29	37	13	264	1 498
(% cals)		(44% cals)	(17% cals)	(39% cals)	(11% cals)		
N	(17)	(17)	(17)	(17)	(17)	(17)	(17)

FIRST WEEK NUTRITIONAL VALUES* (One participant failed to submit dietary data to dialician.)

1	1 247	248	56	5	2	122	640
2	1 631	380	69	8	2	138	882
3	1 736	233	67	8	2	139	800
4	1 430	283	55	7	2	138	796
5	1 463	299	56	7	2	138	760
6	1 193	223	68	8	2	138	811
7	1 347	263	67	7	2	136	799
8	1 966	386	68	8	2	139	905
9	1 497	268	73	10	3	157	881
10	1 831	386	72	8	2	136	880
11	1 422	278	68	8	2	139	831
12	1 593	327	62	7	2	125	846
13	1 177	220	64	7	2	138	827
14	1 696	346	70	8	3	138	784
15*	---	---	---	---	---	---	---
16	1 649	334	69	8	2	138	852
17	1 976	401	84	10	3	165	1 064
Mean	1 529	305gms	68 gms	8 gms	2 gms	139 mgs	849 mgs
STD	251	59	5	1	0	10	67
(%Cals)		(80% cals)	(18% cals)	(5% cals)	(1% cals)		
N	(16)*	(16)	(16)	(16)	(16)	(16)	(16)